

# VU Research Portal

## Prognostic MRI parameters in laryngeal cancer and lymphatic metastasis

Ljumanovic, R.

2010

### **document version**

Publisher's PDF, also known as Version of record

[Link to publication in VU Research Portal](#)

### **citation for published version (APA)**

Ljumanovic, R. (2010). *Prognostic MRI parameters in laryngeal cancer and lymphatic metastasis*. [PhD-Thesis - Research and graduation internal, Vrije Universiteit Amsterdam].

### **General rights**

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal ?

### **Take down policy**

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

### **E-mail address:**

[vuresearchportal.ub@vu.nl](mailto:vuresearchportal.ub@vu.nl)

## Prognostic MRI parameters in laryngeal cancer and lymphatic metastasis

This research described in this thesis was conducted at the Department of Radiology of the VU University Medical Center (VUMC), Amsterdam, the Netherlands.

The research was supported by CVZ/VAZ (projectnumber 01244)

This thesis is financially supported by:

Department of Radiology VUMC

Guerbet Nederland B.V.

Eli Lilly Nederland B.V.

GE Healthcare B.V.

Sectra Benelux

Amgen B.V.

Layout: Chris Bor, AMC Amsterdam

Cover: Dijana Alagic, Studio Alagic

Printed by: Buijten & Schipperheijn Amsterdam

ISBN: 9789086594948

Copyright © 2010, Redina Ljumanovic, Amsterdam, the Netherlands. No part of this thesis may be produced, stored or transmitted by any other form or by any means, without prior permission of the author.

VRIJE UNIVERSITEIT

# Prognostic MRI parameters in laryngeal cancer and lymphatic metastasis

## **ACADEMISCH PROEFSCHRIFT**

ter verkrijging van de graad Doctor aan  
de Vrije Universiteit Amsterdam,  
op gezag van de rector magnificus  
prof.dr. L.M. Bouter,  
in het openbaar te verdedigen  
ten overstaan van de promotiecommissie  
van de faculteit der Geneeskunde  
op dinsdag 23 november 2010 om 13.45 uur  
in de aula van de universiteit,  
De Boelelaan 1105

door

Redina Ljumanovic  
geboren te Sarajevo, Joegoslavië

promotoren: prof.dr. J.A. Castelijns  
prof.dr. C.R. Leemans  
prof.dr. J.A. Langendijk  
copromotor: prof.dr. O.S. Hoekstra

Voor mijn ouders  
Za mamu i tatu



# CONTENTS

	Introduction and aims of the thesis	9
	<b>PRE-TREATMENT LARYNGEAL CANCER</b>	
Chapter 1	Supraglottic carcinoma treated with curative radiation therapy: Identification of prognostic groups with MR imaging	27
Chapter 2	MR imaging predictors of local control of glottic squamous cell carcinoma treated with radiation alone	47
Chapter 3	Has the degree of contrast enhancement with MR imaging in laryngeal carcinoma added value to anatomic parameters regarding prediction of response to radiation therapy?	65
	<b>PRE-TREATMENT NECK AND DISTANT MEASTASES</b>	
Chapter 4	Distant metastases in head and neck carcinoma: Identification of prognostic groups with MR imaging	83
	<b>POST-TREATMENT LARYNGEAL CANCER</b>	
Chapter 5	Pre- and post-radiotherapy MRI results as a predictive model for response in laryngeal carcinoma	103
	Summary, discussion and future perspectives	121
	Nederlandse samenvatting	139
	Dankwoord	147
	Curriculum Vitae	155



